UNIFORMLY CONVERGENT DIFFERENCE SCHEME FOR SINGULARLY PERTURBED PROBLEM OF MIXED TYPE[*]

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Abstract. A one dimensional singularly perturbed elliptic problem with discontinuous coefficients is considered. The domain under consideration is partitioned into two subdomains. In the first subdomain a convection-diffusion-reaction equation is posed. In the second one we have a pure reaction-diffusion equation. The problem is discretized using an inverse-monotone finite volume method on Shishkin meshes. We establish an almost second-order global pointwise convergence that is uniform with respect to the perturbation parameter. Numerical experiments that support the theoretical results are given.

Key words. convection-diffusion problems, singular perturbation, asymptotic analysis, finite volume methods, modified upwind approximations, uniform convergence, Shishkin mesh

AMS subject classifications. 34A36,34E05, 34E15, 65L10, 65L12, 65L20, 65L50

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